

## CLAIMS

What is claimed is:

1. A method for improving utilization of a SAS wide port having a number ( $n$ ) PHYs associated therewith, the method comprising:
  - receiving an I/O request from a requesting host system requesting a transaction involving a range of data having a size of  $S$  units of data;
  - determining if the size of the I/O request data ( $S$ ) is greater than a threshold size ( $T$ );
  - in response to a determination that  $S > T$ , performing the steps of:
    - determining a number ( $M$ ) of PHYs available for use to process the I/O request;
    - subdividing the I/O request into  $M$  smaller I/O requests of substantially equal size;
    - processing the  $M$  smaller requests substantially in parallel using the  $M$  available PHYs; and
    - returning a single status to the requesting host system indicating the status of the processing of the  $M$  smaller requests.
2. The method of claim 1 further comprising statically determining the value of  $T$ .
3. The method of claim 1 further comprising dynamically determining the value of  $T$ .
4. The method of claim 3 wherein the step of dynamically determining further comprises:
  - dynamically determining the value of  $T$  as a function of a number of currently outstanding transactions.
5. The method of claim 1 wherein the method is operable within a SAS driver of a host system's operating system.

6. The method of claim 1 wherein the method is operable within a SAS initiator device controller.

7. The method of claim 1 wherein the method is operable within a SAS expander forwarding a request from a SAS initiator to a SAS target.

8. A method operable in a SAS domain having a SAS wide port coupling a SAS initiator to a SAS target, the method comprising:  
generating a large I/O request directed toward the SAS target;  
splitting the large I/O request into a plurality of smaller I/O requests;  
distributing the smaller I/O requests over a plurality of the PHYs that comprise the SAS wide port;  
detecting completion of the plurality of smaller I/O requests; and  
completing the large I/O request in response to detecting completion of each of the plurality of smaller I/O requests.

9. The method of claim 8 further comprising:  
determining whether the large I/O request is larger than a threshold value, wherein the steps of splitting, distributing, detecting and completing are responsive to a determination that the large I/O request is larger than the threshold value.

10. The method of claim 9 further comprising:  
dynamically determining the threshold value as a function of operating parameters of the SAS domain.

11. The method of claim 8 wherein the plurality of PHYs includes a number ( $n$ ) of PHYs that comprise the SAS wide port and wherein the step of splitting further comprises:

splitting the large I/O request into a number ( $M$ ) of smaller I/O requests where  $M \leq n$ .

12. The method of claim 11 further comprising:

determining  $M$  as the maximum number of PHYs available to process the smaller I/O requests.

13. The method of claim 8 wherein the SAS domain includes a host system incorporating the SAS initiator and wherein the host system has a driver for communicating with the SAS initiator and wherein the method is operable in the driver of the host system.

14. The method of claim 8 wherein the method is operable in the SAS initiator.

15. The method of claim 8 wherein the SAS domain includes a SAS expander coupled intermediate the SAS initiator and the SAS target and coupled to each by corresponding SAS wide ports and wherein the steps of splitting, distributing and detecting are operable within the SAS expander.

16. A system for improving utilization of a SAS wide port having a number ( $n$ ) PHYs associated therewith, the system comprising:

means for receiving an I/O request from a requesting host system requesting a transaction involving a range of data having a size of  $S$  units of data;

means for determining if the size of the I/O request data ( $S$ ) is greater than a threshold size ( $T$ );

means responsive to a determination that  $S > T$ , including:

means for determining a number ( $M$ ) of PHYs available for use to process the I/O request;

means for subdividing the I/O request into  $M$  smaller I/O requests of substantially equal size;

means for processing the  $M$  smaller requests substantially in parallel using the  $M$  available PHYs; and

means for returning a single status to the requesting host system indicating the status of the processing of the  $M$  smaller requests.

17. The system of claim 16 further comprising means for statically determining the value of  $T$ .

18. The system of claim 16 further comprising means for dynamically determining the value of  $T$ .

19. The system of claim 18 wherein the means for dynamically determining further comprises:

means for dynamically determining the value of  $T$  as a function of a number of currently outstanding transactions.

20. The system of claim 16 wherein the system is operable within a SAS driver of a host system's operating system.

21. The system of claim 16 wherein the system is operable within a SAS initiator device controller.

22. The system of claim 16 wherein the system is operable within a SAS expander forwarding a request from a SAS initiator to a SAS target.